

## WHAT IS CLAIMED IS:

## 1. An automatic gain control circuit comprising:

an amplifier having at least a received signal and an analog gain control signal as separate inputs, wherein the amplifier amplifies the received signal by a amplification factor which is controlled by the analog gain control signal;

an analog-to-digital converter configured to convert the amplified signal from analog format to digital format;

a signal strength estimator configured to measure the signal strength of the amplified signal;

a gain adjusting factor device configured to generate a gain adjusting factor;

a multiplier configured to multiply a digital gain control signal by said gain adjusting factor;

and

a digital-to-analog converter configured to convert a gain control signal from digital format to analog format.

## 2. The automatic gain control circuit according to claim 1, further comprising:

a mapping device configured to map a signal into a different signal; and

a delay device configured to insert some delay for a loop.

## 3. The automatic gain control circuit according to claim 1, wherein said gain adjusting factor device contains means for generating a gain adjusting factor based on a predetermined relation between signal strength and gain adjusting factor.

## 4. The gain adjusting factor device according to claim 3, wherein said predetermined relation is described by one from the group consisting of a mathematical formula, a curve, and a set of number pairs.

## 5. The automatic gain control circuit according to claim 1, wherein said gain adjusting factor device contains means for generating a gain adjusting factor inversely proportional to said signal strength.

6. The automatic gain control circuit according to claim 1, wherein said gain adjusting factor device has signal strength, a plurality of reference signal strengths, and a plurality of reference gain adjusting factors as input and gain adjusting factor as its output.

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7. The adjusting factor device according to claim 6, further comprising:  
a comparing logic circuit configured to generate an index according to the measured signal strength; and

a selecting logic circuit configured to select a gain adjusting factor from a plurality of gain adjusting factors according to said index.

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8. An automatic gain control circuit, comprising:

an amplifier having at least a received signal and an analog gain control signal as separate inputs, wherein the amplifier amplifies the received signal by amplification factor which is controlled by the analog gain control signal;

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a signal strength estimator configured to measure the strength of the amplified signal;

a first memory device configured to store a plurality of signal strengths;

a gain generating device configured to generate a gain; and

a second memory device configured to store a plurality of gains.

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9. The automatic gain control circuit according to claim 8, further comprising:

an analog-to-digital converter configured to convert the amplified signal from analog format to digital format;

a delay device configured to insert some delay; and

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a digital-to-analog converter configured to convert a gain control signal from digital format to analog format.

10. The digital automatic gain control circuit according to claim 8, wherein said gain generating device contains means to generate gain by making use of current gain and a number of previous

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gains.

11. The digital automatic gain control circuit according to claim 8, wherein said gain generating device contains means to generate gain by making use of current signal strength and a number of previous signal strengths to update gain.

12. The automatic gain control circuit according to claim 8, wherein said gain generating device contains means for generating gain based on the signal strengths stored on said first memory device and the gains stored on said second memory device update gain.

13. The automatic gain control circuit according to claim 8, wherein said gain generating device contains means for generating gain dynamically.

14. The automatic gain control circuit according to claim 8, wherein said gain generating circuit contains means for generating gain differently under different scenarios.

15. A method for automatically varying a gain control signal for a receiver, comprising the steps of:

- a) amplifying a received signal according to an adjustable amplification factor, wherein the adjustable amplification factor is determined by an analog gain control signal;
- b) converting the amplified signal from analog to digital format;
- c) calculating the strength of the amplified signal;
- d) generating new gain based on previous gains and signal strengths; and
- e) converting the new gain from digital format into analog format to generate analog gain control signal.

16. The method according to claim 15, wherein said generating new gain updates gain by multiplying it with a gain adjusting factor.

17. The method according to claim 16, wherein said gain adjusting factor generates a gain

adjusting factor based on a mathematics formula describing the relation between signal strength and gain adjusting factor.

18. The method according to claim 16, wherein said gain adjusting factor generates a gain  
5 adjusting factor based on a set of number pairs describing the relation between signal strength and gain adjusting factor.

19. The method according to claim 15, wherein said generating new gain produces gain based  
10 on the relation of new gain versus current signal strength and current gain.

20. The method according to claim 15, wherein said generating new gain creates gain based on  
the relation of new gain versus current and previous signal strengths and current and previous  
15 gains.

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